

NOTICE OF DEFICIENCY

The Dow Chemical Company (Dow)
Midland, Michigan
MID 000 724 724

Remedial Investigation Scopes of Work (SOWs)
for Corrective Action Beyond the Facility Boundary
Midland Area Soils
and
Tittabawassee River and Floodplain

December 12, 2003

General Comments Applicable to Both the Midland Area Soils (Midland) SOW and the Tittabawassee River and Floodplain (Tittabawassee) SOW

1. **General.** The draft revised SOWs shared with Michigan Department of Environmental Quality (MDEQ) staff at the review meetings described in the cover letter to this Notice of Deficiency (NOD) have shown significant progress in addressing many of the verbal comments on the general organization and content of the SOWs that were made to Dow at the initial review meetings. Comments 2 and 7 below address the primary outstanding organizational issues. Since the MDEQ still has not received full copies of the draft revised SOWs, including all proposed attachments, it is not possible to provide further comments on the overall organization of the SOWs at this time.

Response Required: The SOWs must be revised to reflect the discussions at the review meetings and the comments provided herein.

2. **Task I: Interim Response Activities (IRAs) - Page 3, First Paragraph, of Both SOWs (Previously Identified to Dow on August 14, 2003).** These paragraphs inaccurately indicate that "Following MDEQ approval of an IRA, Dow will submit an IRA Workplan for review and approval as provided for in License Condition XI.G." Condition XI.B.3.(a) of the Operating License requires the SOW to identify and propose the implementation of specific IRAs for the protection of public health for the areas identified in Condition XI.B.2. of the Operating License that are known through prior environmental sampling to be impacted by releases from the facility. The Operating License also requires Dow to be prepared to immediately implement the IRAs upon approval by the Chief of the Waste and Hazardous Materials Division (WHMD). The path set forth in the Operating License for IRAs proposed in the SOW does not include or reference the step of submitting an IRA Work Plan for approval under Condition XI.G. of the Operating License, but requires more immediate action for those areas that are known to be impacted through prior environmental sampling. It is also noted

that, unlike Condition XI.G., Condition XI.B. is not subject to the dispute resolution provisions of Condition XI.E. of the Operating License.

Response Required: The SOWs must be revised to include the detailed IRA Work Plans that can be immediately implemented upon approval. During the SOW technical review meetings, Dow has indicated that the SOWs will be modified to include the required IRA Work Plans as attachments to the SOWs. Dow has also indicated that the IRAs will be divided into two categories: Those that will reduce exposure and can be implemented immediately in areas of known contamination and those that require further investigation. This response would be acceptable.

In addition, the references to Condition XI.G. must be removed.

3. **Task I: Interim Response Activities - Page 3, Fourth Paragraph, of Both SOWs.** These paragraphs indicate that "IRAs are immediate actions based on available data that may not be final remedial actions and are activities undertaken to address potential human exposure pathways." This statement appears to limit IRAs to available data or existing data and to human exposure pathways. IRAs are also required for areas where data is not directly available but conditions indicate that contamination at levels of concern can be reasonably presumed to be present. For example, as noted below, an IRA is necessary to identify residential properties that may be similar to Riverside Boulevard where it can be reasonably concluded that similar high levels of contamination could be present. IRAs are also applicable to ecological exposure pathways.

Response Required: The SOWs must be modified to address the above noted concerns by broadening the definition of an IRA as follows: "An IRA is a short-term action that is taken to control ongoing risks while site characterization is underway or before a final remedy is selected." The limiting statements noted above must be removed.

4. **Task I: Interim Response Activities - Page 3, Fifth Paragraph, of Both SOWs.** These paragraphs indicate that the MDEQ has requested the IRAs listed in the SOWs. This is inaccurate. The MDEQ met with Dow and provided examples of what may be appropriate IRA activities that could be immediately implemented to begin reducing exposures. Specific IRAs were not identified by the MDEQ for inclusion in the SOWs. For clarification, it should be noted that Dow did not propose all of the example IRAs discussed with MDEQ and several of the IRAs proposed by Dow did not originate from MDEQ examples. For example, the MDEQ identified a range of alternatives that Dow could offer to Riverside Boulevard residents to immediately begin reducing exposure prior to further investigation. This important concept was not proposed in the Tittabawassee SOW.

Response Required: The SOWs must be revised to remove the statement that the specific IRAs were requested by the MDEQ.

5. **Task I: Interim Response Activities - Page 3, Paragraph A., of Midland SOW; Page 5, Paragraph G., of Tittabawassee SOW.** This task indicates that Dow will establish Community Information Centers. The Operating License requires Dow to identify and propose the implementation of specific IRAs for the protection of human health for the areas that are known through prior environmental sampling to be impacted by releases from the facility. Dow is required to be prepared to implement these IRAs as needed to reduce exposures upon approval of the Chief of the WHMD. The SOWs do not provide the level of information necessary for the immediate implementation of the IRAs upon approval by the Chief of the WHMD.

Response Required: The SOWs must be revised to include detailed IRA Work Plans for the establishment of the proposed Community Information Centers.

It is noted that that this IRA could be combined with the IRA proposal to develop public information materials for more efficient review and approval. These IRA Work Plans must indicate that all of the information materials provided to the public for the purposes of reducing the potential for exposure will receive MDEQ review and approval prior to making them available to the public. This is necessary to ensure that a consistent and accurate message is communicated to the public regarding health and exposure control issues.

6. **Task I: Interim Response Activities - Page 4, Paragraph B., of Midland SOW; Page 6, Paragraph H., of Tittabawassee SOW.** These tasks indicate that Dow will develop public information materials. The Operating License requires Dow to identify and propose the implementation of specific IRAs for the protection of human health for the areas that are known through prior environmental sampling to be impacted by releases from the facility. Dow is required to be prepared to implement these IRAs as needed to reduce exposures upon approval of the Chief of the WHMD. The SOWs do not provide the level of information necessary for the immediate implementation of the IRA upon approval by the Chief of the WHMD.

Response Required: The SOWs must be revised to include detailed IRA Work Plans for the development of the public information materials for review and approval as part of the SOWs.

It is noted that that this IRA could be combined with the IRA proposal to establish Community Information Centers for more efficient review and approval. These IRA Work Plans must indicate that all of the public information materials provided to the public for the purposes of reducing the potential for exposure will receive MDEQ review and approval prior to use. This is necessary to ensure that an

accurate and consistent message is communicated to the public regarding health and exposure control issues.

7. **Task I: Interim Response Activities - Required IRA Not Present in the SOWs for Notifying Workers and Residents Who Disturb Soil of Potential Contamination.** The SOWs do not propose an IRA to establish a reliable means to notify workers and the general public of precautions to be taken by utility workers, construction workers, or any person conducting activities involving contact with soils in the “frequently flooded areas” of the Tittabawassee River or in known areas of contamination in Midland.

Response Required: The SOWs must be revised to include implementable work plans to establish a reliable means of communicating the potential hazards and the precautions that should be taken when disturbing soil or sediment in the areas of contamination.

One such mechanism that would be effective in communication and exposure reduction is to have the areas of known contamination filed with “Miss Dig” so any subsurface workers could be alerted to the precautions necessary for these areas.

8. **General Comment on Task II: Description of Current Conditions; Task III: RI [Remedial Investigation] Work Plan Requirements; and Task IV: Remedial Investigation; of Both SOWs.** These tasks as proposed and sequenced do not address the requirements of the Operating License to conduct RIs that address the requirements listed in R 299.5528(3) of the administrative rules promulgated pursuant to Part 201, Environmental Remediation, of Michigan’s Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Revision of these tasks is necessary to simplify and clarify the SOWs and to ensure that the RIs are conducted in accordance with the conditions of the Operating License within an acceptable period of time.

Response Required: The relevant information contained within these three proposed tasks must be consolidated into one task that is entitled “RI Work Plan.” In addition, each of the requirements of R 299.5528(3) must be addressed by the RI Work Plans.

Task II: The Description of Current Conditions Report must be submitted as a part of the RI Work Plans. Approval of a Description of Current Conditions Report is not necessary prior to the development of the RI Work Plans (see comment 10, below). The Description of Current Conditions Report will be updated as additional information is developed as part of the RI process.

Task III: The RI Work Plan Requirements tasks must be eliminated. This proposed task contains some of the required elements of R 299.5528(3), but does not comprehensively address the Operating License requirements for the

implementation of the RIs. It appears that the intent of the proposed task was to develop some core documents for use during implementation of the RI Work Plans. The development of these documents must be proposed as part of the RI Work Plans.

Task IV: The RI task contains some of the types of information and processes that would typically be submitted as part of the RI Work Plans. Task IV, Remedial Investigation, must be revised to simply indicate that “the approved RI Work Plans will be implemented on the schedule contained within the work plans.”

In order to resolve this deficiency, Dow must consolidate the relevant information in Tasks II, III, and IV into a single Task entitled “RI Work Plan.” In addition, Condition XI.B.3.(b) of the Operating License identifies RI Work Plan requirements that Dow must address in planning, submitting, and conducting each project/area/phase of the RI. These requirements are listed in R 299.5528(3) of the administrative rules under Part 201.

The RI Work Plan Task of the SOWs must specifically list and address each of the following technical requirements of R 299.5528(3):

R 299.5528(3)	The information that shall be provided in a remedial investigation, as appropriate to the facility, is as follows:
R 299.5528(3)(a)	Definition of the nature and extent of contamination...
R 299.5528(3)(b)	Risks to the public health, safety, and welfare and to the environment and natural resources, including the identification of any water wells
R 299.5528(3)(c)	Relevant exposure pathways.
R 299.5528(3)(d)	All of the following with respect to hazardous substances that are present: (i) Amount; (ii) Concentration; (iii) Hazardous properties; (iv) Environmental fate; (v) Bioaccumulative properties; (vi) Persistence; (vii) Mobility; and (viii) Physical state.
R 299.5528(3)(e)	All of the following with respect to the physical setting of the facility: (i) Geology; (ii) Hydrology; (iii) Hydrogeology; (iv) Depth to saturated zone; (v) Hydrologic gradients; (vi) Proximity to aquifers; (vii) Proximity to surface water; (viii) Proximity to floodplains; and (ix) Proximity to wetlands.
R 299.5528(3)(f)	Current and potential groundwater use.
R 299.5528(3)(g)	Source identification and evaluation.
R 299.5528(3)(i)	The likelihood of future releases if the hazardous substances remain at the facility.
R 299.5528(3)(j)	The extent to which natural or human-made barriers currently contain the hazardous substances and the adequacy of the barriers.

R 299.5528(3)(k)	The impact of any planned demolition activities on conditions at the facility.
R 299.5528(3)(l)	The extent to which hazardous substances have migrated or are expected to migrate from the area of release
R 299.5528(3)(m)	An evaluation of injury to, destruction of, or loss of natural resources related to the release.
R 299.5528(3)(n)	Contribution of the hazardous substances at the facility to contamination of the air, land, or water.
R 299.5528(3)(o)	Legally applicable or relevant and appropriate state and federal requirements.
R 299.5528(3)(p)	Sampling design and rationale for parameter selection.
R 299.5528(3)(q)	A description of monitoring well construction.
R 299.5528(3)(r)	A description of, and rationale for, any geophysical techniques used in the investigation.
R 299.5528(3)(s)	Sample collection and preparation procedures.
R 299.5528(3)(t)	Identification of the laboratory or laboratories responsible for sample analysis.
R 299.5528(3)(u)	Laboratory methods used to generate all remedial investigation data
R 299.5528(3)(v)	A description of any statistical methods used to evaluate laboratory data relative to cleanup criteria
R 299.5528(3)(w)	Other matters appropriate to the facility

9. **Task II: Description of Current Conditions - Pages 6 and 7 of the Tittabawassee SOW and Pages 4 and 5 of the Midland SOW.**

Response Required: The wording of these tasks must be revised to reflect their status as components of the RI Work Plan(s).

As noted in Comment 8, above, the Description of Current Conditions Reports must be submitted as part of the RI Work Plan components of the SOWs.

Paragraph C., Definition of Data Gaps, must be revised to replace the word "address" with the word "describe."

The word "tentative" must be added in front of the word "identification" in each of the following paragraphs: C.1., C.2., C.2.a., C.2.b., C.2.c., and C.2.d.

10. **Task II: Description of Current Conditions - Paragraph B. of Both SOWs (Previously Identified to Dow on August 14, 2003).** The SOWs appear to define only dioxins and furans as the "chemicals of concern." Dow is required to conduct an RI that includes characterization of all contaminants that have been or may have been released beyond the facility boundary. It is not appropriate to narrow the SOWs to dioxins and furans at this time.

Response Required: The SOWs must be revised to broaden the definition of contaminants of concern to any contaminant that has been or may have been released beyond the facility boundary. This list of contaminants may be narrowed as the RI proceeds.

11. **Task IV: Remedial Investigation of the Tittabawassee SOW and Midland SOW.** As noted in Comment 8, the relevant information in this task needs to be consolidated with the relevant information in Tasks II and III and proposed in a new task, "RI Work Plan."

Response Required: The wording of the components of these Tasks must be revised to appropriately reflect their status as components of the RI Work Plan. For example, the first sentence of this paragraph should be revised as follows (additions are shown **in bold**, deletions shown in ~~strike-out text~~): "More specifically, the RI **Work Plan** will ~~involve~~ **propose** a series of investigations ~~necessary~~ to:" These types of changes need to be made throughout this paragraph to reflect that the work being proposed as part of the RI Work Plan will be reviewed and approved prior to implementation.

12. **Task IV: Remedial Investigation - Page 9, Third Paragraph, of the Tittabawassee SOW; Page 6, Sixth Paragraph, of the Midland SOW.** The Tittabawassee SOW states that: "The purpose of a RI is to assess conditions in order to select an appropriate remedial action, if one is required, that adequately addresses those conditions. The remedial investigation will define the nature and extent of conditions in the Tittabawassee River Sediments and Floodplain." The Midland SOW states that: "The purpose of a Remedial Investigation ("RI") is to assess conditions in order to select an appropriate remedial action, if one is required, that adequately addresses those conditions. The RI defines the nature and extent of conditions in Midland Soils Area."

The above wording does not define the purpose of an RI in a manner that is consistent with Part 201 (R 299.5528). For example, the word "contamination" has been replaced with the word "conditions" in the phrase: "The remedial investigation will define the nature and extent of conditions. . . ." In addition, the purpose of an RI is to identify the source or sources of contamination and define the nature and extent of contamination that may have migrated beyond the facility boundary in excess of the applicable generic residential cleanup criteria.

Response Required: The definition of RI in these paragraphs must be revised as follows to be consistent with the regulatory definition of an RI as identified in R 299.5528: "The purpose of a remedial investigation is to assess site conditions in order to select an appropriate remedial action, if one is required, that adequately addresses those conditions. The remedial investigation identifies the source or sources of any contamination and defines the nature and extent of contamination originating from that source. Defining the nature and extent of contamination includes identifying contamination that may have migrated beyond

the boundary of the source property in excess of applicable generic residential cleanup criteria.”

13. **Task IV: Remedial Investigation - Page 9, Third Paragraph, of the Tittabawassee SOW; Page 6, Seventh Paragraph, of the Midland SOW.** The series of investigations described by these paragraphs does not comprehensively address the requirements of the Operating License for an RI.

Response Required: These paragraphs must be revised to comprehensively address the requirements of an RI (see comment 7, above). For example, the RI Work Plans must include a proposal to evaluate any injury to, destruction of, or loss of natural resources related to the release in accordance with R 299.5528(3)(m).

14. **Task IV: Remedial Investigation - Paragraphs C. and C.1.c. of the Tittabawassee and Midland SOWs.** These paragraphs indicate that “These data shall be sufficient to define the concentrations of chemicals of concern in the study area,” and that “The approach chosen will result in a sampling plan that will characterize the concentration of chemicals of concern in the Tittabawassee River sediments and floodplain soils. . . .” These statements do not meet the regulatory requirements of an RI to define the nature and extent of contamination that exceed the applicable generic residential cleanup criteria.

Response Required: These statements must be clarified and expanded to be consistent with the requirements of the RI to define the nature and extent of contamination in the Tittabawassee River sediments and floodplain soils and the Midland area soils. In addition, the SOWs must state that additional sampling will be conducted, as necessary, to define the nature and extent of contamination in the study areas that exceed the applicable generic residential cleanup criteria.

15. **Task IV: Remedial Investigation - Page 14, Paragraph F., of Both SOWs.** These paragraphs indicate that Dow will conduct human health risk assessment. As noted above, work plans for each of the studies proposed as part of the corrective action process must be submitted as part of the RI Work Plans.

The United States Environmental Protection Agency (U.S. EPA) has provided the following comments with respect to Dow’s proposal in the SOWs to conduct probabilistic risk assessment (PRA):

The recommendations detailed in the U.S. EPA document *Risk Assessment Guidance for Superfund: Volume III - Part A, Process for Conducting Probabilistic Risk Assessment* (U.S. EPA, 2001) should be considered. Accordingly, U.S. EPA recommends that Dow consider the following key guiding concepts:

- Use a tiered approach to incorporating PRA into site risk assessments.
- Submit a work plan for Agency review prior to initiating work on a PRA.
- Perform a point estimate assessment prior to considering a PRA.
- While a PRA can provide a useful tool to characterize and quantify variability and uncertainty in risk assessments, it is not appropriate for every site.
- A PRA generally requires more time, resources, and expertise on the part of the assessor, reviewer, and risk manager than a point estimate risk assessment.
- The decision to use PRA is site-specific and is based on the complexity of the problems at the site, the quality and extent of site-specific data, and the likely utility of the result.
- If the additional information provided from a PRA is unlikely to affect the risk management decisions, then it may not be prudent to proceed with a PRA. However, if there is a clear value added from performing a PRA, then the use of PRA as a risk assessment tool generally should be considered, despite the additional resources that may be needed.

Communicating the results of a PRA will be more challenging than communicating the results of a point estimate risk assessment because PRA and its perspective will be new to most participants.

If the decision is made to conduct a PRA, it is important to include the community in the planning process. Communication on the PRA may involve: providing the community with a basic understanding of the principles of PRA, discussing the proposed work plan and inviting comments on the proposed approach, discussing site-specific data, and communicating the final results and how they impact decisions for the site.

Response Required: The SOWs must be revised to specifically indicate that if Dow chooses to propose site-specific criteria, then as part of the RI Work Plans, Dow will submit detailed and comprehensive work plans for the development of site-specific criteria for MDEQ review and approval prior to the development of any site-specific criteria. Site-specific criteria must be developed in accordance with Part 201 and the associated administrative rules and in accordance with the applicable U.S. EPA guidance as detailed above. Due to the controversial nature of this issue, it will be necessary to conduct enhanced public participation to ensure transparency.

16. **Task IV: Remedial Investigation - Paragraph F.2. of Both SOWs.** The statement "Toxicity assessment is equivalent to hazard identification" is inaccurate. Hazard identification is a component of toxicity assessment and

identifies potential adverse effects of each contaminant of concern. A dose-response assessment for each sensitive/critical adverse effect is also necessary.

Response Required: The statement "Toxicity assessment is equivalent to hazard identification" must be removed. This paragraph must be revised and expanded to represent the appropriate toxicity assessment components of a risk assessment, which are hazard identification and dose-response assessment. The paragraph must also state that these components will be proposed in the RI Work Plans for each contaminant of concern considering the requirements of Part 201 and the associated administrative rules, including the use of best available science, weight of evidence, and most sensitive effect.

17. **Task IV: Remedial Investigation - Paragraph F.3. of Both SOWS.** This paragraph describes both forward looking risk estimates and back calculated criteria (site-specific criteria). Forward looking risk estimates are only appropriate for prioritization of response activities. Determination of the necessity of corrective measures is determined by media concentrations of contaminants of concern that exceed applicable Part 201 criteria.

Response Required: This paragraph must be revised to clarify that the risk estimates (both the theoretical cancer risk and noncancer hazard index/quotient) will only be used for prioritization of response activities. In addition, this paragraph must be revised to clarify that "the floodplain soil and sediment concentrations that do not pose an unacceptable risk" will be determined through development of site-specific criteria pursuant to Part 201 and the associated administrative rules. Both forward looking risk estimates and development of Part 201 criteria require the submittal of a work plan, including the exposure pathways to be evaluated, exposure assumptions, toxicity assessment, and uncertainty analysis, prior to characterization of the risk.

The risk characterization process must also include evaluation of the most sensitive effect for each exposure pathway.

18. **Task V: Reports of Both SOWs.** As noted above, the Description of Current Conditions Reports must be submitted as a component of the RI Work Plans in order to facilitate implementation of the RIs in a timely manner.

Response Required: The SOWs must be revised to indicate that RI Work Plans will contain the Descriptions of Current Conditions Reports.

19. **Task VI: Public Participation Plans for Both SOWs.** These tasks address communication with the public via fact sheets, community information centers, and a Web site. These tasks need to be clarified to indicate that any information communicated to the general public to satisfy the conditions of the Operating License will be reviewed and approved by the MDEQ in advance of release to the public. This is necessary to ensure that an accurate and consistent message

is delivered to the public regarding human and environmental health issues and the corrective action process. A schedule for the development of the mailing list must be provided.

Response Required: These paragraphs must be revised to indicate that all of the information that Dow releases to the general public for the purposes of satisfying the conditions of the Operating License will be reviewed and approved by the MDEQ prior to release. This would include all fact sheets, information provided at the Community Information Centers, and information posted on the proposed community information Web site.

In addition, Dow must propose a schedule in each of the SOWs for the development of the proposed mailing lists and the submittal of the mailing lists to the MDEQ. This list must be developed as soon as possible in order to implement the interim response activities.

20. **Task VI: Public Participation Plan - Paragraph C.1. of Both SOWs.** These paragraphs address the proposed Community Information Center paper document repository.

Response Required: These paragraphs must be revised to indicate that the Community Information Center paper document repository will be open at times that are convenient for the general public.

21. **Task VI: Public Participation Plan - Paragraph D.1. of Both SOWs.** These paragraphs address public meetings that Dow will arrange and indicate: "Public Meetings will be scheduled in conjunction with the initial submission and following approval of Dow's written submissions of Workplans and significant reports." This commitment does not provide for scheduling of public meetings at other times during the corrective action process to provide enhanced public participation on complex or controversial issues.

Response Required: This paragraph must be revised to indicate that public meetings will also be scheduled at the request of the MDEQ and/or to address complex or controversial issues.

22. **Proposed Schedule of Tasks and Schedule of Submissions of Both SOWs.** The proposed schedule of tasks must be revised and simplified to address the requirements of the Operating License in a more timely manner and to address the comments provided in this NOD. In particular, the SOWs must be revised to provide for immediate implementation of the IRAs upon approval of the SOW(s) or individual IRAs and to provide for the implementation of the high priority components of the RI during the 2004 field season.

Response Required: The proposed schedule of tasks and schedule of submissions must be compressed, revised, and simplified as follows:

The schedule must be revised to indicate that the IRAs will be immediately implemented upon approval of the SOW(s) or individual IRAs unless prior MDEQ approval has been granted or Dow chooses to proceed with the implementation of the IRA at their own risk.

The Description of Current Conditions Report (including the Definition of Data Gaps), the Project Management Plan, the Data Collection Project Assurance Project Plan, and the Data Management Plan must be submitted as components of the RI Work Plans. The RI Work Plans are to be submitted within 120 days after approval of the SOW(s). Individual components of the RI Work Plans may be proposed to be submitted in phases in order to prevent delay in the implementation of the high priority components of the RI.

The RI Work Plan(s), and/or specific components thereof, are to be implemented upon approval on the schedule contained within the RI Work Plan(s).

The RI Report(s), and/or specific components thereof, are to be submitted within 60 days of completion of the RI Work Plan(s) or completion of an approved RI Work Plan component.

23. **General Comment on Prioritization of Work - Both SOWs. (Previously Identified to Dow on August 14, 2003).** The SOWs, as written, do not appropriately prioritize work on a schedule based on consideration of potential risks to human health and the environment in accordance with Condition XI.B.3.(b) of the Operating License.

Response Required: The SOWs must be revised to clearly describe the proposed phasing and prioritization of the work to be conducted as part of the RI. The SOWs must be revised to appropriately prioritize the sequence of investigation activities in a manner that results in work being conducted to address the highest potentials for human and ecological exposures first and ensures that this work is done in a timely manner. As an example, under the proposed schedule, Dow would not be proceeding with the identification of property that is frequently flooded (and, therefore, probably contaminated) until almost a year after the SOW is approved (without even considering the time necessary for regulatory review and approval). The same concern applies to the identification and characterization of the areas of highest contamination in Midland.

24. **General Comment on Proposed Schedule of Tasks and Schedule of Submissions - Both SOWs (Previously Identified to Dow on August 14, 2003).** The proposed schedules indicate that a six-month period is necessary to prepare a Description of Current Conditions Report and that approval of that report is necessary to begin the development of an RI Work Plan. This is not

necessary and is not consistent with prioritizing the RI work to address the areas with the highest potential for human and ecological exposures.

Response Required: The SOWs must be revised to indicate that the Description of Current Conditions Report will be submitted as a component of the RI Work Plan to accelerate the review and approval process. The proposed schedule must be modified to provide for the commencement of the RI during the 2004 field season. Data collection necessary for the evaluation and implementation of IRAs must be initiated yet this year.

25. **General Comment on Specific Areas Proposed for Investigation - Both SOWs (Previously Identified to Dow on August 14, 2003).** The SOWs do not identify any specific areas for investigation as required by Condition XI.B.3.(b)(ii) of the Operating License other than the four areas proposed in the Tittabawassee SOW for IRAs. Examples of specific areas for investigation that must be identified in the SOWs include, but are not limited to, residential properties within the Tittabawassee River floodplain that flood frequently (more than once since the flood of 1986); agricultural properties in the Tittabawassee River floodplain that flood frequently; Tittabawassee River sediments in the area of concern; residential properties within the city of Midland that are located to the east or north of the Dow facility; parks and schools within the city of Midland that are located north or east of the Dow facility; etc.

Response Required: The SOWs must identify specific areas for investigation as noted above as part of the RI Work Plans. These areas must be prioritized for investigation as noted in Comment 9.

26. **General Comment on Identification of Exposure Pathways - Both SOWs (Previously Identified to Dow on August 14, 2003).** Condition XI.B.3.(b)(i) of the Operating License requires Dow to identify in the SOWs additional potential exposure pathways that do not have Part 201 generic criteria (e.g., food chain exposures, house dust, etc.). Currently, the SOWs state that additional exposure pathways will be identified and evaluated and, therefore, do not address this requirement.

Response Required: The SOWs must be revised to identify the required potential exposure pathways that are known or suspected to be of concern at this time. It is recognized that additional exposure pathways may be identified as the RI proceeds.

Tittabawassee SOW

27. **Task I: Interim Response Activities - Page 3, Paragraph A. (Previously Identified to Dow on August 14, 2003).** This proposed IRA indicates that Dow will offer to do blood and soil testing and an exposure evaluation in advance of RI activities. These activities alone are not adequate. Sampling and exposure

investigation can and should be a part of the IRA for this area, but direct mitigation is also required. The MDEQ has identified this area as the highest priority for an IRA to begin reducing the potential for exposure and has repeatedly requested Dow to provide the IRA Work Plan for Riverside Boulevard. On November 26, 2003, Dow submitted a proposed letter to Riverside Boulevard residents marked "Draft for Discussion Only," but it does not constitute an adequate IRA Work Plan for this high priority IRA.

Response Required: The SOW must be revised to include an implementable IRA Work Plan for the Riverside Boulevard area that includes a range of alternatives that will be immediately offered to the residents to begin reducing their potential for exposure. The IRA Work Plan must also include detailed plans for additional soil sampling and any other activities necessary for the proposed exposure investigation.

28. **Task I: Interim Response Activities - Required IRAs for Identification of Other Highly Contaminated Residential Properties in the Tittabawassee River Area of Concern - Not Present in the SOW.** The SOW does not propose IRAs to identify any other residential properties in the Tittabawassee River area of concern that are or may be highly contaminated so that immediate sampling and exposure controls, if necessary, may be implemented.

Response Required: The SOW must be revised to include an implementable IRA Work Plan that immediately identifies the above-referenced residential properties for sampling. This could be done by modifying the "Comprehensive Mapping of the Tittabawassee River and Floodplain" IRA by specifically indicating that the first phase of this mapping process will be to identify frequently flooded residential properties for immediate characterization.

29. **Task I: Interim Response Activities - Required IRA for Placement of Warning Signs at Unofficial High Public Use Areas - Not Present in the SOW.** The SOW does not propose IRAs to place warning signs at the unofficial high public use areas such as the Dice Road pumping station and Smith's Crossing area. In addition, other public areas of known or suspected contamination must be posted with approved warning signs. These areas include, at a minimum, the Center Road Boat Launch, Caldwell Boat Launch, Germania Golf Course, Greenpoint Nature Center, and Shiawassee National Wildlife Refuge.

Response Required: The SOW must be revised to include an implementable IRA Work Plan for placement and maintenance of acceptable warning signs at the above-identified locations, along with sampling and evaluation to determine if barrier controls are required to prevent or mitigate exposure.

30. **Task I: Interim Response Activities - Required IRA for Placement of Effective Warning Signs - Not Present in the SOW.** The signs currently in use at Imerman Memorial Park, West Michigan Park, Freeland Festival Park, and the Center Road Boat Launch are not effective at communicating the potential risk of utilizing these facilities where high levels of dioxin and furan contamination have been found.

Response Required: The SOW must be revised to include an implementable IRA Work Plan to effectively post the above facilities with signage that clearly communicates the potential risks of using the facilities and the precautions that should be taken. The signs must also describe the fish advisories on the Tittabawassee River and specifically identify the fish that should not be eaten. The IRA Work Plan must contain proposed the proposed wording and sizes for the signs and a description of where the signs will be posted.

31. **Task I: Interim Response Activities - Required IRA for Addressing Frequently Flooded Dow Owned Property in Active Agricultural Use - Not Present in the SOW.** The SOW does not propose IRAs to address exposure and/or risks associated with active agricultural use of property owned by Dow that is located in frequently flooded areas of the Tittabawassee River floodplain.

Response Required: The SOW must be revised to include an implementable IRA Work Plan to characterize frequently flooded Dow owned agricultural properties to determine if they are contaminated and, if so, to remove them from production or otherwise address the contamination prior to the next growing season. Alternatively, these properties may be presumed to be contaminated and removed from production without the need for characterization sampling.

One option that was suggested by the Michigan Department of Agriculture (MDA) and previously discussed with Dow is to put the frequently flooded agricultural property into the Conservation Reserve Program (CRP) and the Conservation Reserve Enhancement Program (CREP). The MDA supports testing of agricultural properties on the floodplain areas and advocates that areas within the floodplain, as a matter of good environmental stewardship, be put into the CRP and CREP when funds become available whether or not these areas have been proven to be contaminated by dioxin.

32. **Task I: Interim Response Activities - Required IRA Not Present in the SOW for Addressing Non-Dow Owned Frequently Flooded Agricultural Properties.** The SOW does not propose IRAs to address exposure and/or risks associated with active agricultural use of non-Dow owned properties located in frequently flooded areas of the Tittabawassee River floodplain that may be contaminated.

Response Required: The SOW must be revised to include an implementable IRA Work Plan to identify and characterize non-Dow owned agricultural

properties that are located in frequently flooded areas of the Tittabawassee River floodplain. If determined to be contaminated, a mechanism(s) must be proposed to remove these properties from production or otherwise address the contamination in a manner that is acceptable to the property owners. Refer to the comment immediately above regarding putting such properties into the CRP and CREP.

33. **Task I: Interim Response Activities - Required IRA for Management of Contaminated Dredged Sediments and Disturbed Soil - Not Present in the SOW.** The SOW does not propose IRAs to assist local units of government and affected residents with the management of contaminated dredged sediments and soils that are generated within and/or removed from frequently flooded areas of the Tittabawassee River floodplain.

Response Required: The SOW must be revised to include an implementable IRA Work Plan to provide technical and financial assistance to local units of government and affected residents for the appropriate disposal/management of contaminated sediments and soils that are generated by dredging or soil movement activities in the Tittabawassee River Area of Concern.

34. **Task I: Interim Response Activities - Pages 4 and 5, Paragraphs B., C., and D.** These paragraphs describe proposed IRAs for Imerman Memorial Park, Freeland Festival Park, and West Michigan Park. Other than the titles, the proposed IRAs are identical and indicate that Dow will propose sampling and analysis to further characterize soil to determine relevant exposure pathways and that the results of the characterization will be used as the basis for a proposal for further appropriate actions. It is not necessary to conduct further characterization prior to proposing IRAs that will begin reducing the potential for exposure. Existing data collected by the MDEQ is adequate to begin initiating IRAs such as barrier controls and education.

On October 31, 2003, Dow submitted IRA Work Plans for the above facilities. Although preliminary comments on the Work Plans were provided to Dow on November 5, 2003, by the WHMD via e-mail, these Work Plans remain under review by the MDEQ. The concerns raised in the November 5, 2003, e-mail are summarized as follows:

- All IRAs are subject to MDEQ review and approval. Dow does have the option to proceed at their own risk with the implementation of IRAs without prior MDEQ review and approval. In the SOW review meetings prior to submittal of the IRA Work Plans, Dow committed to keeping the MDEQ informed about IRAs in order to facilitate implementation. In general, any IRA that proposes or requires additional sampling should receive prior MDEQ review and approval to ensure adequacy and to allow the opportunity for split sampling.

- The MDEQ has serious concerns that Dow has reached agreements on the IRAs listed above without honoring its commitment to keep the MDEQ involved “up front” in IRA activities and that the implementation of IRAs could be delayed if the agreements that Dow has reached with affected property owners or municipalities are not adequate to meet regulatory requirements. The cover letters to the proposed IRAs clearly state that Dow has reached agreement on these IRAs with the municipalities. In follow up, Dow was directed to notify the municipalities immediately, with copies to this office, that the proposed IRAs have not been reviewed or approved by the MDEQ and that additional work or different IRAs may be required to provide effective exposure mitigation and receive regulatory approval. The MDEQ never received written verification that these notifications were made. Therefore, on December 3, 2003, the MDEQ met with the affected municipalities and parks staff to discuss the Dow Operating License corrective action requirements and convey related information. In the future, correspondence and meetings involving these IRAs should include all parties (local units of government/parks, Dow, and MDEQ staff) for efficient communication in order to facilitate timely implementation of effective IRAs.

The IRAs also indicate that the work is to be conducted by the local units of government with reimbursement by Dow. It is possible that this could cause the local units of government to become liable for additional future costs, if the work performed results in exacerbation of existing contamination and/or results in increased future remediation costs.

In addition, the IRAs do not indicate how the health and safety issues associated with implementation will be addressed.

Detailed comments on the IRA Work Plans will be provided separately from this NOD.

Response Required: The SOW must be revised to include implementable IRA Work Plans for these areas that are already known to be highly contaminated with dioxins and furans. The IRA Work Plans must be revised to address the specific technical review comments when they are received. Further data collection must be proposed to delineate the areas of contamination during the RI Phase of the SOW.

The IRA Work Plans must be revised to document that Dow will not attempt to hold the municipalities liable for additional cleanup costs that may result from the implementation of the IRAs (i.e., exacerbation of the existing contamination or causing final remediation to become more costly as a result of the IRAs) that are performed at Dow’s request.

Levels of dioxin and furan contamination have been documented to exceed applicable regulatory criteria. Therefore, appropriate Health and Safety Plans

must be prepared and followed by the workers that implement the proposed IRAs. Dow must ensure that if work is implemented by the municipalities on their behalf, appropriate health and safety precautions will be taken.

35. **Task I: Interim Response Activities - Page 5, Paragraph E.** This proposed IRA is to prepare comprehensive mapping of the Tittabawassee River and Floodplain. The MDEQ agrees that this is an appropriate IRA. However, the SOW does not contain an implementable work plan for this activity.

Response Required: The SOW must be modified to include an implementable IRA Work Plan for the proposed comprehensive mapping of the Tittabawassee River floodplain. A required component of this IRA is to immediately identify those residential properties that are frequently flooded so that timely sampling can be conducted and appropriate exposure controls can be implemented, if necessary (also see Comment 28).

36. **Task I: Interim Response Activities - Page 5, Paragraph F.** This proposed IRA is to evaluate the potential exposure pathway of wild game taken from the Tittabawassee River floodplain for human consumption. The Operating License requires an implementable work plan to be included as part of the SOW.

Response Required: The SOW must be revised to include the separately submitted IRA Work Plan for the proposed wild game evaluation. It is noted that Dow received limited approval to collect samples for this activity, along with initial technical review comments on the Work Plan, on November 10, 2003. A full draft of the Work Plan for this evaluation was submitted to the MDEQ on November 24, 2003.

37. **Task II: Description of Current Conditions - Page 7, Paragraph C.2.a.** This paragraph appears to limit the media that may require additional sampling to sediment, soil, surface water, or air.

Response Required: This paragraph must be revised to be inclusive of all potential media that may be determined to have "data gaps." For example, house dust and wildlife are examples of media where data gaps are present.

38. **Task IV: Remedial Investigation Activity Not Proposed - Pilot Test Sediment Traps and Other Similar Technology(ies) in Known Areas of Contamination in the Tittabawassee River.** The SOW does not indicate that the RI will propose investigation of remedial technology(ies) applicable to the development of future remediation work. One of the purposes of the RI is to develop information necessary to design appropriate remedial measures.

Response Required: The SOW must be revised to indicate that the RI will include activities to collect data to support the design of or test the viability of potential future remedial alternatives. For example, test sediment traps would

provide valuable information useful for evaluating different technologies, as well as beginning to reduce the mass of contamination in the river system.

39. **Task IV: Remedial Investigation - Page 9, Paragraph A.1.** This paragraph describes types of characteristics that will be investigated in floodplain soils and river sediments. Additional information is required to be developed during the RI.

Response Required: This paragraph must be revised to propose investigation of surficial soil and sediment characteristics and the relationship, if present, between contaminant concentrations and grain size and organic carbon. This is necessary in order to determine what types of remediation may be most appropriate to begin reducing the mass of contamination in the watershed.

40. **Task IV: Remedial Investigation - Page 10, Paragraph A.1.d.** This paragraph addresses sediment transport between the river and the floodplain. It must also address down-watershed transport of contaminants.

Response Required: This paragraph must be revised to propose investigation of the movement of contaminants down the watershed as well as between the river and the floodplain.

41. **Task IV: Remedial Investigation - Page 11, Paragraph B.** This paragraph must be revised to be more comprehensive. Dow is required to determine if there are continuing sources of contamination to the Tittabawassee River that are currently being released from the facility or that may have been released historically. The current language appears to only address "known" information on the nature and extent of potential source areas. During the RI, Dow will be required to develop additional information beyond what is currently known (or not known) about these sources.

Response Required: The SOW must be revised to provide for the development of Work Plans to investigate historical and/or current source(s) of contaminants that are or may be a continuing long-term source(s) of contamination to the Tittabawassee River. For example, the results of the 2002 caged fish study recently submitted to the MDEQ by Dow indicates that a number of chlorobenzene and chlorophenol compounds accumulated in fish caged adjacent to the Dow facility for 28 days. It is not known if the accumulation of these contaminants is the result of current releases to the river from Dow or from historical release(s) that have resulted in a reservoir(s) of contaminants in the river sediments or in deeper sand units beneath the river. It is probable that direct investigation of the river will be necessary to determine if there are reservoir sources that must be addressed.

42. **Task IV: Remedial Investigation - Page 11, Paragraph C.1.a.** There appears to be a typographical error in the sentence.

Response Required: The words “sediments or soils” must be replaced with “sediments **and** soils.”

43. **Task IV: Remedial Investigation - Pages 11 and 12, Paragraph C.1.d.** This paragraph does not include investigation of the relationship, if any, between grain size and dioxin and furan content.

Response Required: The phrase “determine the relationship between grain size and chemicals of concern” must be added to this paragraph.

44. **Task IV: Remedial Investigation - Page 12, Paragraph D.** This paragraph indicates that “A variety of evaluations will be performed on existing data to determine what additional data is required to be able to generate site specific criteria as provided for in License Condition XI.B.3.b(iv) and to aid in the prioritization activities.”

Response Required: The SOW must be revised to indicate that if Dow chooses to pursue the development of site-specific criteria as provided for under the Part 201 rules, Work Plans for the development of the additional data necessary to generate the site-specific criteria will be proposed as part of the RI Work Plan.

45. **Task IV: Remedial Investigation - Page 12, Paragraph D.1.a.** This paragraph does not include the review of soil survey maps to assist is the determination of what properties are frequently flooded.

Response Required: Add “soil survey maps,” after topographic maps in this paragraph.

46. **Task IV: Remedial Investigation - Page 12, Paragraph D.1.c.** This paragraph is unclear: “The sampling data that shows the concentrations and depths of the location of the chemicals of concern identified will be compared with the locations where there is significant human activity in order to determine where there is the highest potential for exposure to the highest concentrations of chemicals of concern.”

Response Required: This statement must be reworded for clarity. Technical review of this paragraph cannot be provided at this time.

47. **Task IV: Remedial Investigation - Page 13, Paragraph E.** This paragraph states that: “If present, any observable impacts to ecological habitants or receptors will be described.” This statement does not comprehensively address Dow’s corrective action requirements to investigate impacts that may not be readily observable.

Response Required: This paragraph must be revised to propose investigations, as necessary, to identify potential impacts that may not be readily observable.

The MDEQ recently completed an aquatic ecological risk assessment using sediment, fish, and chicken and duck egg data from contaminated portions of the Tittabawassee River and floodplain. The least conservative calculations of risk (least protective of wildlife) conducted during this assessment indicate that substantial risk to wildlife through the aquatic food chain is present in the Tittabawassee River from dioxin and furan contamination. The potential impacts predicted by this risk assessment must be directly investigated as part of the RI.

In addition, recent scientific literature has linked dioxin contamination to lake trout egg mortality. In order to maintain the Saginaw Bay walleye fishery, the Michigan Department of Natural Resources conducts massive restocking of fry in the Tittabawassee River. The effect of the existing dioxin and furan contamination on the viability of walleye eggs and other fish species eggs must also be investigated as a part of the RI.

48. **Task IV: Remedial Investigation - Page 13, Paragraph E.1.** This paragraph describes characteristics that will be identified related to current and reasonably anticipated receptor identification and land use restrictions where contamination is present.

Response Required: This paragraph must be revised to directly reference current and reasonably anticipated future uses and reliable restrictions as described by Part 201 and associated administrative rules.

49. **Task IV: Remedial Investigation - Page 13, Paragraph E.1.b.** This paragraph indicates: "The following characteristics will be identified: . . . b. Any use restrictions relative to the Tittabawassee River and Floodplain and the locations where significant concentrations of chemicals of concern are present. . . ." The word "significant" is ambiguous and needs to be clarified.

Response Required: The phrase "significant concentrations of chemicals of concern" must be replaced in this sentence with the phrase "chemicals of concern that exceed the applicable regulatory criteria." As an example, Dow is required to determine the areas of the floodplain that exceed the 90 parts per trillion Part 201 residential direct contact criteria for dioxin and furan toxic equivalent concentration (commonly referred to as "TEQ").

50. **Task IV: Remedial Investigation - Page 13, Paragraph E.2.** This paragraph indicates that "A general description of the ecosystem overlying and in proximity to the Tittabawassee River and Floodplain including, but not limited to: . . ." will be provided as part of the Current and Reasonably Anticipated Receptor Identification component of this task. In addition, the wording of

Paragraph E.2.b. is ambiguous and must be clarified and expanded to meet the intent of the RI.

Response Required: The SOW must be revised to indicate that the RI will include a detailed description of the ecosystems. This is required in order to evaluate the appropriate remedial actions. The word “general” in Paragraph E.2. must be replaced with the word “detailed.” Paragraph E.2.b. must to be clarified to indicate that the detailed description of the ecosystem will include the identification of the “key” plant and animal species. The current wording is too limited and only indicates that “several species composition” will be identified.

51. **Task IV: Remedial Investigation - Page 14, Paragraph E.3.d.** This paragraph appears to contain a typographical error.

Response Required: The sentence “A demographic profile of the people who use or have access to the Tittabawassee River and Floodplain.” must be identified as a separate component of this task (e.g., as new Paragraph E.3.e.).

52. **Task IV: Remedial Investigation - Page 14, Paragraph E.4.** This paragraph indicates that studies will be conducted to support the evaluation of Potential Human Exposure Pathways. In addition to the studies proposed, consideration of dietary exposure, including consumption of local fish and locally raised produce and livestock, must be investigated as part of the RI. Also, evaluation of chemicals of concern associated with crops (both uptake and adhered soil) is necessary to more completely determine the potential exposure from this pathway. Specifically, plant uptake may not be the most important component of contaminant transfer from fruit and vegetable consumption, as compared to soil adherence or entrainment. Finally, as the RI is implemented, additional studies, beyond what is described in this paragraph, may be determined to be necessary.

Response Required: As noted above, Work Plans for each of the studies described in this paragraph must be submitted as part of the RI Work Plan. Therefore, the SOW must be revised to specifically indicate that Dow will submit Work Plans for each of the studies described in this paragraph for MDEQ review and approval prior to the initiation of each study. Because of the controversial nature of these issues, it will be necessary to conduct enhanced public participation to help ensure transparency. This paragraph must also be revised to provide for the conduct of additional studies, if determined to be necessary by Dow or the MDEQ, as additional information becomes available during the corrective action process.

A study to evaluate the dietary exposure to contaminants of concern, including consumption of local fish, local produce, and local livestock must be added to this paragraph.

Paragraph E.4.b. must be revised to indicate that the soils to be tested for bioavailability will be selected to be statistically representative of the different soil characteristics and contaminant concentrations present in the study area.

Paragraph E.4.c. must be revised to more completely address this pathway by evaluating the exposure contribution from contaminated soil from the floodplain that has adhered to or is entrained with crop material.

53. **Task IV: Remedial Investigation - Page 14, Paragraph F.1.** This paragraph indicates that: "Dow will evaluate the level and routes of potential exposure to chemicals of concern to humans via Tittabawassee River Sediments and Floodplain soils." This statement must be clarified and expanded to address other applicable direct and indirect pathways that can contribute exposure to contaminants of concern such as dietary exposure (e.g., both local and national market basket and home grown produce, domestically raised livestock [if applicable] and consumption of local fish).

Response Required: The above statement must be expanded and clarified to indicate that any exposure assessment conducted will include the potential contribution of exposures to contaminants of concern from all relevant sources.

54. **Task IV: Remedial Investigation - Page 15, Paragraph G.** This paragraph indicates that "A baseline ecological risk study to be conducted by Michigan State University [MSU] will be initiated in advance of the RI." This statement inaccurately characterizes the work that MSU is conducting under a grant from Dow. Dow has clarified this relationship in meetings and in a letter to the MDEQ dated November 20, 2003, and received December 2, 2003. MSU will be conducting basic research on ecological risk in the Tittabawassee River and on the floodplain. This information will be used by Dow or a Dow contractor to complete an ecological risk assessment. At this time MSU is not conducting an ecological risk assessment to satisfy the requirements of the RI.

It will not be known if the risk assessment approach outlined in the SOW will be acceptable until a detailed and comprehensive Work Plan is submitted by Dow for MDEQ review and approval.

Response Required: This statement must be corrected to accurately characterize the relationship between Dow and MSU. This statement must indicate that Dow will be conducting an ecological risk assessment in conformance with applicable U.S. EPA guidance and in accordance with an MDEQ-approved Work Plan.

55. **Task IV: Remedial Investigation - Page 15, Paragraph G.** This paragraph does not reference the aquatic ecological risk assessment that has been completed by a contractor to the MDEQ on the Tittabawassee River. It is noted

that this risk assessment had not yet been completed at the time that Dow was required to submit the SOW.

This aquatic ecological risk assessment was completed using sediment, fish, and chicken and duck egg data from contaminated portions of the Tittabawassee River and from uncontaminated reference areas and was conducted using the best available science in compliance with U.S. EPA guidance. A range of risk calculations was performed using the sediment and biological data and progressively less conservative exposure assumptions from the applicable scientific literature. The least conservative calculations of risk (least protective of wildlife) indicate that substantial risk to wildlife through the aquatic food chain is present in the Tittabawassee River from dioxin and furan contamination. Future risk assessment work conducted by Dow should focus on the terrestrial component of ecological risk assessment and on the specific actions that Dow can take to most effectively mitigate ecological risk in the Tittabawassee River and floodplain.

Response Required: This paragraph must be revised in a manner that reflects the current level of information on ecological risk in the Tittabawassee River as noted above and to address those concerns identified the MDEQ's aquatic risk assessment. For your convenience the report on the aquatic risk assessment can be found at <http://www.michigan.gov/tittabawassee>.

Midland Area Soils SOW

56. **Task I: Interim Response Activities - Required IRA for Investigation of Midland Residential Neighborhoods Near Dow - Not Present in the SOW.**

The SOW does not propose an IRA to immediately investigate the residential areas that are suspected to have the highest levels of dioxin and furan contamination based on existing data.

Response Required: The SOW must be revised to include an implementable IRA Work Plan to immediately conduct investigations of the dioxin and furan concentrations in the residential neighborhoods that are closest to the northern and eastern boundaries of the Dow facility.

57. **Task I: Interim Response Activities - Required IRA for Exposure Mitigation at Previously Sampled Public Use Areas - Not Present in the SOW.**

The SOW does not propose an IRA to directly mitigate exposure at the previously sampled public use areas (parks and schools) that have been shown to exceed the generic residential direct contact criteria for dioxins and furans.

Response Required: The SOW must be revised to include an implementable IRA Work Plan to provide direct mitigation of exposure at the parks and schools that have been determined by previous sampling to exceed the generic residential direct contact criteria for dioxins and furans. Initially, this could be

done by establishing focused play areas or providing existing focused play areas with clean soil or other appropriate exposure barriers to minimize contact with contaminated soil.

58. **Task IV: Remedial Investigation - Page 8, Paragraph B.** This paragraph indicates that the evaluation of continuing sources will be conducted by coordinating with the soil monitoring program that is required by Condition X.L. of the Operating License. This monitoring program only addresses dioxins and furans. As noted above, Dow's corrective action obligations are not limited to dioxins and furans. Dow has the obligation to determine if other contaminants or chemicals of concern are currently being released or may have been released beyond the facility boundary.

Response Required: The SOW must be revised to indicate that in addition to utilizing the information from the Soil Monitoring Program required by Condition X.L. of the Operating License, Dow will perform any other investigations necessary to evaluate the potential for continuing sources of contaminants other than dioxins and furans. These investigations must be proposed for review and approval as part of the RI Work Plan process.

59. **Task IV: Remedial Investigation - Pages 8 and 9, Paragraphs D.1. and D.2.** These paragraphs contain several typographical errors and require additional clarification.

Response Required: The word "approached" in Paragraph D.1. must be replaced with the word "approach." The word "location" in Paragraph D.2. must be replaced with the word "locations." In addition, for clarity, this paragraph must be revised to indicate that the proposed phased approach to sampling will be implemented after MDEQ review and approval and that the proposed phased approach will result in the definition of the nature and extent of contamination in the Midland area that exceeds the applicable generic residential cleanup criteria.

60. **Task IV: Remedial Investigation - Page 9, Paragraph E.3.** This paragraph indicates that studies will be conducted to support the evaluation of potential human exposure pathways. In addition to the studies proposed, consideration of dietary exposure, including consumption of local fish and livestock as applicable, must be investigated as part of the RI. Also, evaluation of chemicals of concern associated with crops (both uptake and adhered soil) is necessary to more completely determine the potential exposure from this pathway. Specifically, plant uptake may not be the most important component of contaminant transfer from fruit and vegetable consumption, as compared to soil adherence or entrainment. Finally, as the RI is implemented, additional studies, beyond what is described in this paragraph, may be determined to be necessary.

Response Required: As noted above, Work Plans for each of the studies described in this paragraph must be submitted as part of the RI Work Plan.

Therefore, the SOW must be revised to specifically indicate that Dow will submit work plans for each of the studies described in this paragraph for MDEQ review and approval prior to the initiation of each study. Because of the controversial nature of these issues, it will be necessary to conduct enhanced public participation to help ensure transparency. This paragraph must also be revised to provide for the conduct of additional studies, if determined to be necessary by Dow or the MDEQ, as additional information becomes available during the corrective action process.

A study to evaluate the dietary exposure to contaminants of concern, including consumption of local fish, local produce, and local livestock, as applicable, must be added to this paragraph.

Paragraph E.3.a. must be revised to indicate that the soils to be tested for bioavailability will be selected to be statistically representative of the different soil characteristics and contaminant concentrations present in the study area.

Paragraph E.3.b. must be revised to include evaluation of the contribution of soil adhered to or entrained with crop material for this pathway.

61. **Task IV: Remedial Investigation - Page 10, Paragraph F.** The first paragraph in this paragraph indicates that: "Dow will conduct site-specific risk assessments for the Midland Area Soils utilizing all available data as well as data to be generated by the RI to develop site-specific criteria as provided for in License Condition XI.B.3.b.(iv)." This paragraph, in the context of the other proposed SOW tasks, suggests that the additional data required to be collected to define the nature and extent of contamination may not be used for the development of the site-specific risk assessment. Also, it is noted that Dow is required to conduct corrective action on any contaminant that has been released from the facility. The SOW and RI are not limited solely to dioxins and furans.

Response Required: The SOW must be expanded and clarified to indicate that the proposed risk assessments will also use the data collected to define the nature and extent of contamination to conduct the risk assessment.

62. **Task IV: Remedial Investigation - Page 10, Paragraph F.1.** This paragraph states "Exposure Assessment: As required in Condition XI.B.3.(b) of the license, Dow will evaluate critical chemicals of concern fate and transport processes (fate, mobility, and availability) in relation to the spatial and temporal distribution of chemicals of concerns [sic] in the Midland Area Soils." The meaning and intent of this paragraph is unclear.

Response Required: This paragraph must be rewritten to be understandable to the reviewers. Technical comment will be provided at that time.

63. **Task IV: Remedial Investigation, Paragraph G.** This paragraph indicates that: "Dow will consult with MDEQ regarding the need for an Ecological Risk Assessment for the Midland Area Soils study area." This process is not addressed in the RI Work Plan.

Response Required: This paragraph must be revised to indicate that Dow will propose an ecological risk assessment for the Midland Area Soils in the RI Work Plan or will provide justification for not conducting an assessment for MDEQ review and approval. Note that until Dow identifies the nature and extent of contamination for all relevant contaminants in the Midland area, it may not be possible to conclude that an ecological risk assessment is not necessary.